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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,462	08/21/2003	Jin-Sung Chung	5649-1149	5932

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MYERS BIGEL SIBLEY & SAJOVEC  
PO BOX 37428  
RALEIGH, NC 27627

EXAMINER
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GURLEY, LYNNE ANN

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 01/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/644,462

Applicant(s)

CHUNG, JIN-SUNG

Examiner

Lynne A. Gurley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 18 and 24-28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 19-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-17 and 19-23, drawn to a method of making a semiconductor device, classified in class 438, subclass 637.
  - II. Claims 18 and 24-28, drawn to a semiconductor device, classified in class 257, subclass 758+.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by another and materially different method, i.e. a method wherein a polishing buffer layer is not needed.
3. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Mitchell Bigel on 1/2/04 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-17 and 19-23. Affirmation of this election must be made by applicant in replying to this Office action. Claims 18 and 24-28

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have been withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### **DETAILED ACTION**

#### ***Priority***

5. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### ***Specification***

6. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

#### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 4-6 and 8-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Biolsi et al. (US 2002/0177301, dated 11/28/02, filed 7/15/02).

Biolsi shows the method as claimed in Figures 3b, 4b, 5b...9b, 10-11 and 12a-12b and 13 and corresponding text with polishing buffer 14, via hole 24, sacrificial film 27 and 22, etching to form the trench (fig. 9b0, removing the sacrificial film (fig. 10), etching buffer layer 25 combined with barrier layer (Ta/TaN) and metal interconnection 26. Note that since the etching buffer layer is not claimed as a protective layer, the layer 25 may serve as an etching buffer layer in the broadest interpretation.

***Claim Rejections - 35 USC § 103***

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 1-17 and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Biolsi et al. (US 2002/0177301, dated 11/28/02, filed 7/15/02) in view of Stamper (US 6,297,149, dated 10/2/01).

Biolsi shows the method substantially as claimed and as described in the preceding paragraphs, with one modification, layer 25, in this interpretation, is used as a barrier layer only.

Biolsi lacks anticipation only in not teaching an etching buffer layer; that the sacrificial film may be a flowable oxide; the etching buffer layer acts as a protective film for the interlayer insulation layer while removing at least some of the sacrificial filling film in the via hole; the

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etching buffer layer is removed and then a barrier film is formed before the interconnect is deposited in the dual damascene pattern; and more than one layer of etch stop and insulation layer may be formed.

Stamper teaches a similar process using a sacrificial layer, which could be a flowable oxide, to form a dual damascene interconnect, wherein an etching buffer layer 501 (column 6, lines 50-60) is used to protect the via or trench (implicitly; column 6, lines 63-67) during the removal of the sacrificial layer. It is subsequently removed.

It would have been obvious to one of ordinary skill in the art to have used the flowable oxide as the sacrificial film and the etch buffer as taught in Stamper in the method of Biolsi, with the motivation that the flowable oxide would perform the same function as the ARC used in Biolsi and the etch buffer would prevent damage to the substrate upon removal of the sacrificial layer.

It would have been obvious to one of ordinary skill in the art to have had more etch stop layers and insulating layers in the method of Biolsi, with the motivation that depending on the geometry of the contact hole and how many layers needed in the device, additional layers may be needed to form the contact hole.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 703-305-3474. The examiner can normally be reached on M-F 7:30-4:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 703-308-3325. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-308-0956.

  
LYNNE GURLEY  
PATENT EXAMINER  
*Art Unit 2812*

LAG

January 11, 2004